

## CHAPTER 15

### SAFETY FEATURES

15-1. General considerations. The designer must be aware of the occupational and public health hazards associated with plant operations and maintenance and provide the safety features to control such hazards. These hazards include mechanical equipment, open pits and tanks; electrical components; toxic, infectious and flammable materials; and potential oxygen-deficient situations.

15-2. Applicable standards. The following will be considered minimum standards. Additional standards may apply depending on the particular plant design and individual features.

a. AR 385-10 Army Safety Program.

b. AR 40-5 Health and Environment.

c. OSHA Standards. Design features will be consistent with the requirements of standards promulgated by OSHA.

15-3. Safety features in plant design. The following safety features listed below are minimum general requirements and are not intended to be all-inclusive. For detailed requirements refer to the applicable standards.

a. Assure adequate ventilation in wet wells and dry wells. The chlorine storage area will be separated from the feed area and from the remaining plant areas. Mechanical exhaust ducts for chlorine storage rooms and the chlorination room will extend from near the floor level and exhaust outside the building. The design will allow for provision of adequate make-up air. Positive mechanical ventilation will be ample in grit and screening chambers as well as in the wet and dry wells. Fan capacities must be sufficient to effect a complete change of air every 2 to 5 minutes. Emergency generators with internal combustion engines will have their exhausts vented outside of the building to prevent carbon monoxide build-up during test or emergency use.

b. Fencing and guard rails will be provided for open tanks, hatchways, and other locations when needed. Stairs will be used for access to pump rooms in preference to vertical ladders. However, when vertical ladders cannot be avoided and their length exceeds 20 feet, they will be equipped with a ladder climbing device, a hoop cage, or offset landings.

c. All electrical wiring will be properly insulated and grounded. Explosion-proof equipment will be provided for enclosed or confined areas where explosive vapors, fumes or gases may accumulate; 110 volts or less for control circuits is desirable in such areas.

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d. Guards will be provided for all exposed moving parts of pumps and equipment. Hoists and rails for removal of heavy equipment will also be provided for operation and maintenance purposes.

e. The plant will be fenced as necessary to protect the public and the facility.

f. The public water supply must be protected to eliminate the possibility of contamination by cross-connections with sewage or sludge piping. This will be achieved by a vertical positive air gap no less than 2 inches between the inlet and the outlet levels of a fixture. The water line utilized for plant washdown will be provided with a backflow prevention device.

g. Signs will be provided designating hazardous areas and nonpotable water taps.

h. Flood lights will be provided for night-time inspection and maintenance.

i. Crowding of equipment will be avoided around pumps, screens, and vacuum filters. Valves and other operating devices must be readily accessible to avoid injury and encourage proper use so that spillage will be prevented.

j. Sludge digestion tanks will be segregated from the rest of the plant and provided with liquid-level indicators or alarms.

k. Good ventilation and a combustible gas indicator will be provided for protection against any leakage in the gas-collection piping and appurtenances.

l. Piping and valves in chlorine room will be color-coded with a primary color of brown and a secondary color of green.

15-4. Safety equipment. Facilities for the following safety equipment must be provided for at the plant:

a. Safety harness with lifeline.

b. First-aid kit.

c. Fire extinguishers (type suitable for anticipated fires).

d. A portable combustible gas indicator where sludge gas is collected.

e. An oxygen deficiency indicator.

f. Hydrogen sulfide and carbon monoxide indicators.

g. A portable air blower.

h. Two or more pressure demand-type compressed-air masks, certified by NIOSH.

15-5. Quick shower. A suitable facility for quick drenching or flushing of the eyes and body will be provided within areas where chemicals are handled, stored, or used except when water presence is a hazard with the chemical.